

USDA
NATURAL RESOURCES
CONSERVATION SERVICE

MARYLAND CONSERVATION
PRACTICE STANDARD

PRESCRIBED GRAZING

CODE 528
(Reported by Acre)

DEFINITION

Managing the controlled harvest of vegetation with grazing animals.

PURPOSES

This practice may be applied as part of a conservation management system to accomplish one or more of the following purposes:

1. Maintain or improve the health and vigor of plant communities and meet the basic needs of livestock;
2. Reduce soil erosion, and maintain or improve soil condition;
3. Maintain or improve water quality and quantity;
4. Improve quantity and quality of forage for livestock health and productivity;
5. Maintain or improve the quantity and quality of food and/or cover for wildlife habitat;
6. Promote economic stability through grazing land sustainability.

**CONDITIONS WHERE PRACTICE
APPLIES**

This practice may be applied on all lands where grazing animals are managed.

CONSIDERATIONS

Consider animal husbandry requirements which may affect the design of the grazing system.

When needed, rest pastures for a period of time to ensure the success of prescribed burning, brush management, seeding, or other conservation practices.

Where practical for the forage species being grazed, start the grazing sequence in a different management unit each growing season.

When weeds are a significant problem, prescribed grazing should be implemented in conjunction with pest management to protect desired plant communities.

Livestock feeding, handling, and watering facilities should be designed and installed in a manner to maintain and/or improve animal distribution. These facilities should also be designed and installed to minimize stress, the spread of disease, parasites, contact with harmful organisms and toxic plants.

Supplemental feed and/or mineral requirements should be balanced with forage consumption to meet the desired nutritional level for the kind and class of grazing livestock.

Natural or artificial shelter may be needed to protect livestock from adverse weather conditions.

Prescribed grazing should consider the needs of other uses of the same land, such as wildlife habitat and recreational uses.

Consider improving carbon sequestration in biomass and soils through management of grazing to produce the desired results.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resource Conservation Service.

CRITERIA

General Criteria Applicable To All Purposes

Document general and specific criteria decisions on the prescribed grazing worksheet MD-RES-528-WS-1, or by using the Maryland C-Graz template. Use MD-RES-528-WS-7 as a comprehensive checklist for developing a prescribed grazing plan.

Frequency and intensity of grazing shall be managed to promote ecologically and economically stable plant communities that meet the producer's objectives. Use stubble height target levels in conjunction with monitoring to help ensure that resource conservation and producer objectives are met.

Manage the kinds of animal, animal numbers, grazing distribution, length of grazing periods, and timing of use to provide sufficient rest (regrowth) from grazing before the next growing period.

Removal of herbage will be in accordance with site production limitations, rate of plant growth, and the physiological needs of specific forage plants to maintain plant reserves for regrowth, winter survival, and drought survival. Use MD-RES-528-WS-1 and WS-4 to assess and document this information.

Maintain sufficient vegetative cover to prevent erosion.

Protect soil, water, air, plant and animal resources when locating livestock feeding, handling and watering facilities.

Manage grazing animals to maintain adequate vegetative cover in sensitive areas, such as riparian corridors, wetlands, and karst areas. Frequency and intensity of grazing shall be managed to protect streambanks from erosion and maintain or improve riparian areas.

Pastured livestock shall not be emaciated, denied access to water, nor left untreated with traumatic wounds or diseases that threaten the life of the animal. Care and handling shall be done in a humane manner.

Additional Criteria to Maintain or Improve the Health and Vigor of Plant Communities and Meet the Basic Needs of Livestock

Adjust grazing periods and/or stocking rates to meet the desired objectives for the plant communities and the associated resources, including the grazing animals.

Duration and intensity of grazing will be based on desired plant health and expected productivity of key forage species to meet management unit objectives.

Determine forage demand per herd based on the total number of animal units and the daily intake rate per animal unit. Determine available supply based on expected forage production in the grazing system and the forage utilization rate (grazing efficiency) appropriate for the system.

For rotational systems, the need for a recovery period for each paddock will also affect whether there is adequate forage production at any given time. This "recovery period" is the amount of time it takes a plant species to regrow to a grazable height.

The recovery period will vary significantly over the growing season. For cool season species, recovery will be faster in the spring. For warm season species, recovery will be faster in mid to late summer. Recovery period days provide valuable information for overall grazing schedules, but they should not be used as the basis for rotating livestock. When using intensive management systems, rotate livestock to and from paddocks based on forage heights, not on fixed calendar dates.

In addition to normal regrowth recovery periods, periodic rest from grazing may be beneficial to maintain or restore the desired plant community following episodic events, such as severe drought.

Refer to Tables 1 through 4, and MD-RES-528-WS-1 through 7 to assess the management unit and design a sustainable grazing system. It is recommended that a computer grazing program such as C-Graz, GSAT, or equivalent be used to estimate forage quantity by time produced and daily needs of livestock being managed.

Additional Criteria to Reduce Soil Erosion and Maintain or Improve Soil Condition

Maintain plant cover at or above 80% ground cover, litter and canopy to maintain or improve infiltration and soil condition.

When grazing crop residue, monitor ground cover during the grazing period and remove animals when residue approaches the minimum amount needed to keep soil loss within tolerance and maintain soil conditions.

Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion. Pasture fencing layouts shall provide laneways that are least prone to livestock trail erosion and provide protection to sensitive areas, such as wetlands. Refer to the Maryland conservation practice standard for Heavy Use Area Protection (Code 561) for design criteria for livestock travel lanes.

Refrain from grazing poorly drained and very poorly drained soils when the soil profile is saturated. It is recommended that all grazing systems have a heavy use or sacrifice area that can be used during wet periods, sparing the other pastures from damage such as long-lasting compaction when soils are saturated. Use the Maryland conservation practice standard for Heavy Use Area Protection (Code 561), or Pasture and Hay Planting (Code 512) for vegetative heavy use areas, using maximum seeding rates for adapted species. An all-season corral, barn, protected livestock yard, indoor arena, or well-drained grass pasture can be suitable for this purpose.

When managing multi-species grazing systems, utilize first and second grazers to improve grazing efficiency. High maintenance animals should be followed by low maintenance animals.

Renovation of pastures may be necessary when existing forages are not producing enough forage to meet the demands of the grazing animals. Refer to the Maryland conservation practice standard for Pasture and Hay Planting (Code 512) for recommended species and planting rates.

Additional Criteria to Maintain or Improve Water Quality and Quantity

Maintain adequate ground cover and plant density to maintain or improve filtering capacity of the vegetation.

Minimize concentrated livestock areas to enhance nutrient distribution and maintain or improve ground cover.

Do not allow livestock to have unrestricted access to streams, seeps, ponds, and other surface waters. Provide alternative watering sites, which may include stream crossings and limited access points. Use filter strips as needed to intercept particulates and soluble pollutants in surface runoff.

Locate areas of high animal concentration away from waterways, streams and ponds whenever possible.

Provide all livestock on pasture with free access to clean water. Water requirements may increase during long periods of temperatures at or above 90°F and humidity above 50%. The following are average daily water requirements for grazing livestock and poultry:

SPECIES	GALLONS/HEAD/ DAY
Dairy cows > 18,000 lbs. milk	35
Dairy cows < 18,000 lbs. milk	25
Dry cows or heifers	15
Calves	7
Beef brood cows	12
Steers in feedlot	18
Dairy, goats or sheep	2
Goats or sheep	1
Horses, mules or donkeys	12
Swine, brood sows	6
Swine, finishing	4
Laying hens	0.09
Broilers	0.06
Turkeys, 15-19 weeks old	0.17
Ducks or geese, 15 - 19 weeks old	0.22

To encourage even grazing pressure, the watering facilities for cattle, horses, sheep and goats shall be located based on the following recommendations. Distances may vary due to economic and ecological constraints:

AVERAGE FIELD SLOPE	MAXIMUM DISTANCE TO WATER
>15%	750 feet
8 - 15%	1100 feet
< 8%	1420 feet

Additional Criteria to Improve Quantity and Quality of Forage and to Improve Livestock Health and Productivity

Plan grazing to match forage quantity and quality with the goals of the livestock producer.

Use planning tools to determine high quality feed and specific time-related needs.

Provide management guidance to develop and use high quality forages and feed stuffs for specific purposes, such as grass-finished beef production or grass-based dairy operations.

Use of computer forage quality planning tools such as NUTBAL or equivalent may be necessary.

Feed Supplements - Using a detailed analysis, balance feed rations with pasture forage to provide the energy, fiber, by-pass protein, vitamins, and minerals necessary to meet the production objectives of the producer and nutritional requirements of the livestock species and age.

Endophytes - Kentucky-31 type toxic endophyte infected tall fescue is not recommended for brood mares or lactating dairy cows. Test fields to determine the level of infestation. Reduce the effects of toxicity by providing an alternative forage. Novel endophyte infected tall fescue, which does not produce toxins harmful to animals, is a good alternative where sites, uses and management conditions are best suited for tall fescue.

Bloat - In pure legume fields where ruminant animals are sensitive to bloat, consider the following:

1. Provide poloxalene free choice prior to first stocking per season;
2. To condition animals, feed livestock prior to pasturing for the first few days;
3. Allow livestock to graze legumes only after water from dew, rain or irrigation has evaporated from foliage and dry hay is made available as free choice in the field.

Poisonous Plants - Scout for poisonous plants such as nightshades and wilting cherry branches and remove if found in levels to cause illness or death. For additional information, consult *100 Poisonous Plants of Maryland*, University of Maryland, Cooperative Extension Bulletin #314.

Indole Alkaloids - Avoid pasturing sheep on reed canarygrass having average concentrations of total indole alkaloids above 0.2% by dry weight. Test existing stands to determine alkaloid levels.

Grass Tetany - Grass tetany can be a problem where a magnesium deficiency occurs, mostly in the spring of the year. Treat by providing free choice blocks or feed additives to maintain blood serum levels of magnesium above 20 ppm. Pastures can be fertilized to prevent tetany.

Cyanogenic Forages - Cyanogenic forages (birdsfoot trefoil, white clover, johnsongrass, sorghum and sudangrass) shall not be grazed when hydrogen cyanide content of the forage dry matter exceeds 200 ppm (as may occur in drought or frost-stressed plants). For sudangrass or sudan-sorghum crosses, refrain from grazing until plants are 24 inches tall. Plants should be tested to determine their hydrogen cyanide level.

Shade - Provide animals with access to natural or artificial shade on days when relative humidity levels exceed 50 percent and air temperatures exceed 90° F. Take into consideration the breed and color of animals. Darker colored animals may show more heat stress signs than lighter coated animals.

Shelter - Provide livestock wintered on pasture access to natural or artificial shelter that keeps the wind chill factor within 5°F of ambient air temperature.

Sanitation - When using a pasture rotation method to break some soil borne parasite cycles, follow the time limits below:

SPECIES	REMOVAL TIME
Cattle	1 Year
Horses	1 Year
Sheep	1 Year
Swine	1 Year
Poultry	2 Years

Additional Criteria to Maintain or Improve the Quantity and Quality of Food and/or Cover for Wildlife Habitat

Manage for diverse plant communities. Manage plant height, structure and density for desired wildlife habitat.

Provide rest from grazing during critical nesting periods. When wildlife habitat is identified as a resource concern, prescribed grazing shall be used to manage the plant community so that it provides the necessary species composition, plant height, structure and density for the desired wildlife species. For most wildlife, a mixed stand of grasses (especially native grasses), forbs, and legumes will provide optimum food and/or cover.

During the nesting season (April 15 to August 15), use only light grazing pressure and do not graze below 6 inches to maintain habitat for ground-nesting birds. Where feasible, graze only one-third of the stand each year or leave ungrazed strips at least 35 feet wide along field edges to provide undisturbed nesting habitat. To provide winter cover, allow sufficient recovery time in the fall so that the stand is at least 8 inches in height before dormancy.

Use appropriate measures to avoid adverse effects to endangered, threatened, and candidate species and their habitats.

Additional Criteria to Promote Economic Stability through Grazing Land Sustainability

Evaluate the economics of the forage system and associated infrastructure. Various farm management computer programs are valuable resources in this evaluation process.

Develop a grazing system that provides forage for as much of the year as possible to minimize supplemental feed costs.

Develop a contingency plan to ensure resource management and economic feasibility without resource degradation.

Control toxic and poisonous plants to reduce the loss of livestock.

Note: Specific cost-sharing programs or other funding sources may dictate criteria in addition to, or more restrictive than, those specified in this standard.

SPECIFICATIONS

Prepare a prescribed grazing plan for all management units where grazing will occur. The prescribed grazing plan shall conform to all applicable federal, state and local laws.

Documentation of the prescribed grazing plan shall be in accordance with the "Supporting Data and Documentation" section of this standard.

OPERATION AND MAINTENANCE

Apply prescribed grazing on a continuing basis throughout the occupation period of all grazing units. Make adjustments as needed to ensure that the goals and objectives of the prescribed grazing strategy are met.

Maintain and/or continue to apply supporting practices such as Fence (Code 382), Pest Management (Code 595), and Nutrient Management (Code 590) that are needed to facilitate implementation of prescribed grazing. Replace fences incapable of controlling livestock to the level required by the grazing system.

Adjust available forage or livestock amounts if stocking rates endanger the productivity of the forage species.

Use a feedlot or sacrifice area when periods of drought threaten the forage species. Locate sacrifice areas in the most environmentally sound fields to control erosion due to overgrazing.

Apply lime and fertilizer when soil tests indicate soil pH and nutrient levels are lower than needed to meet targeted forage yield goals as per stocking rates. Refer to the Maryland conservation practice standards for Nutrient Management (Code 590) and Pasture and Hay Planting (Code 512) for additional details.

Mow pastures as needed to trigger vegetative regrowth and/or control weeds.

Drag pastures as needed to provide more even distribution of nutrients.

Remove or eliminate any hazards, such as loose wire, high walls, heavy limbs, steep slopes, or unsafe water bodies from grazing units.

SUPPORTING DATA AND DOCUMENTATION

The following section provides a list of the minimum data and documentation to be recorded in the producer's case file. ***For necessary forms and applicable tools, refer to the MD-RES-528 WS-7 Checklist for a Prescribed Grazing Plan.***

For All Purposes

Document the following:

1. Goals and Objectives clearly stated brief statement describing the farm operation including enterprises, type of livestock operation, pastures acres, tillable acres, number and kind of livestock, indicate if expansion is planned. Use MD-RES-528-WS-1.
2. Map showing planned pasture layout, acres, fences, lanes, shade, shelter, watering areas, and other components of the grazing system. Note the main forage species in each grazing unit.
3. Resource Inventory (i.e., resource condition, existing structures, facilities, soils). Use MD-RES-528-WS-1.
 - a. Soil map, key to map unit symbols, and soil interpretations. Clearly identify any use limitations and characteristics, with an explanation of each. Include the following information:
 - 1) Land capability classification;
 - 2) Soil drainage class;
 - 3) Available water-holding capacity to 4 feet;
 - 4) Any soil limitations.
 - b. Soil test information, including pH, N-P-K, and recommendations by field. Use MD-RES-528-WS-3;
 - c. Any other site limitations;
 - d. Location of farm physical resources on map (existing structures and facilities, etc).
4. Forage Inventory of the expected forage quantity and species of forage in each management unit during the grazing period.
 - a. List by field of predominant existing species and yield. Identify any problem species. Use MD-RES-512-WS-1.
 - b. List of planned desired forage and likely yield for each unit that will be managed under a prescribed grazing plan. Use MD-RES-528-WS-4.
5. General Forage-Animal Balance developed as a sustainable grazing plan for the management unit(s) to ensure that forage produced or available meets forage demand. Use MD-RES-528-WS-2 and 6.
 - a. Document total animal forage needs;
 - b. List all forage or equivalent grazed ,or fed;
 - c. Document relative balance of needs to the total feed available.
6. Grazing Plan developed for livestock that identifies periods of grazing, rest, and other treatment activities for each management unit. Use MD-RES-528-WS-1, 2, and 5.
 - a. Document specific rotation plans by field;
 - b. Required periods for regrowth time till available to graze again.

7. Worksheet/Inventory showing recommended grazing heights for desirable species in each field when turning into a pasture, and minimum average grazing heights that the forage needs to be maintained at for pasture maintenance. Use MD-RES-528-WS-4.
 - a. Document desirable species to manage for in each grazing unit;
 - b. Document recommended grazing heights for each rotation for each desired species in each grazing unit;
 - c. Provide details on the use of a pasture stick for grazing management to achieve recommend grazing height requirements.
8. Contingency Plan developed that details potential problems (e.g., severe drought, flooding) and serves as a guide for adjusting the grazing prescription to ensure resource management and economic feasibility without resource degradation. Use MD-RES-528-WS-1.
 - a. Plan documenting emergency feed resources and when they will be used, or other alternatives to overgrazing existing pastures;
 - b. Plan to move animals off pastures in wet conditions to a sacrifice area or heavy use area (including corrals or stables) when animal presence will damage vegetation integrity and soil structure;
 - c. Plan to move animals off pastures when minimum residue heights for desired forage is reached during grazing and other pastures have not regrown to recommended start heights. Use MD-RES-528-WS-1.
9. Monitoring Plan developed with appropriate records to assess whether the grazing strategy is meeting objectives. Identify the key areas and key plants that the manager should evaluate in making grazing management decisions. Use MD-RES-528-WS-4.
 - a. Provide a method to evaluate and document specific grazing height requirements to maintain or enhance stand productivity and vigor in each grazing unit, by desirables species and season of use for landowner or consultant use;
 - b. Provide a method to evaluate individual pasture stand condition and grazing system sustainability for landowner or consultant use;
 - c. Provide information on use of a pasture management stick.

**Additional Documentation for Purpose 3 -
Maintain or Improve Water Quality**

1. Information in the narrative and plan map concerning practices to manage access to watercourses. Use MD-RES-528-WS-1.
2. Information in the narrative and on plan map concerning any exclusion management being used (fencing) or limited access management (such as flash grazing).

**Additional Documentation for Purpose 4 -
Improve Quantity and Quality of Forages;
and Purpose 6 - Promote Economic Stability**

1. Detailed Livestock/Forage Balance Sheet to inventory the improved quantity and quality of forage and animal classes, types and amounts;
2. Specific Listing of Additional Feed may include hay, small grain and feed supplements that reduce animal food and forage needs from pasture. Use of computer forage quality planning tools such as NUTBAL or equivalent may be necessary.
3. Detailed Narrative, Table, Schedule, or Grazing System Design for each herd, showing recommend days in each field. Use MD-RES-528-WS-1, 5, and 6.
 - a. Analysis using tools to determine high quality feed and specific time-related animal needs;
 - b. Management guidance to develop and use high quality forages and feed stuffs.

**Additional Documentation for Purpose 5 -
Maintain or Improve the Quantity and Qual-
ity of Wildlife Habitat**

1. Wildlife Enhancement Activities describing methods used to create diverse plant communities, manage plant heights, structure and density of desired wildlife habitat, and provide rest from grazing during critical nesting periods. Use MD-RES-528-WS-1.
 - a. Identify wildlife species of concern;
 - b. Document specific methods to enhance wildlife habitat;
 - c. Document of critical times and heights for forage cover management for desired wildlife.

REFERENCES

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TABLE 1: System Intensity Recommendations for Rotational Systems

Livestock Type	Intake Rate (lbs dry matter/ au/day)	Recommended Rotation Days	Number of Pad- docks	Preferred Density for Livestock When Grazing
Lactating dairy	35 lbs	0.5 to 1 day	15 – 45	40,000+ lbs/ac
Stocker cattle, dairy heifers	30 lbs	1 to 3 days	6 – 45	20,000+ lbs/ac
Beef, cow/calf, swine, or horse	26 lbs	3 to 7 days	3 – 16	10,000+ lbs/ac
Sheep, goats	37 lbs	3 to 7 days	3 - 16	----

TABLE 2: Grazing Efficiency Guidelines

Number of Paddocks ^{1/}	Approximate Days on Each Paddock	Grazing Efficiency
N/A - Continuous grazing	----	0.40 or less (or 0.80 if overgrazed, low yield)
4 to 6	7 to 9 days	0.40 to 0.55
8 to 10	4 days	0.55 to 0.65
24 to 45	1 day or less	0.70 to 0.80
N/A - Hay	----	0.70 to 0.80

TABLE 2 NOTE:

^{1/} In general, as the number of paddocks increase, average paddock size and the number of days on each paddock decreases. Grazing will be more efficient, and more time will be allowed for regrowth in each paddock.

Table 3 provides guidelines concerning when to start and stop grazing established stands. Rotational systems include all systems that provide a recovery period. Based on available data, recommendations for the minimum number of recovery days and number of paddocks are provided in the table.

For all forage species, the lower beginning heights are for peak performance livestock such as lactating dairy cows. Cow/calf operations do well with somewhat lower quality forage found at the taller limits. Grazing at the lower start ranges may not always allow for complete restoration of food reserves and may result in shorter stand life.

TABLE 3: Recommendations for Grazing Heights, Recovery Days, and Number of Paddocks in Rotational Grazing Systems					
Forage Species	Growth Periods	Height in Inches		Recovery Days ^{1/}	Number of Paddocks ^{2/}
		To Begin	To Stop		
Alfalfa	Spring	6" to bud	2 - 3	30	--
	Fall	12 - 18	2 - 3	--	--
	Winter	12 - 18	3	--	--
Annual Ryegrass	Early Spring	6 - 8	3 - 4	21 - 45	7 - 15
	Spring	8 - 10	2 - 3	Replant in Fall	5 - 10
	Fall	6 - 8	4	30 - 60	10 - 20
	Winter	6 - 8	3 - 4	30 - 90	10 - 30
Bermudagrass, (Common and hybrid varieties, plus mixtures with white clovers)	Spring	4 - 6	2 - 3	21-30	7 - 10
	Summer	4 - 6	2 - 3	10 - 21	3 - 7
	Fall	4 - 6	2 - 3	20 - 40	7 - 13
	Frosted ^{3/}	2+	2 - 3	120 - 210	10 - 40 ^{4/}
Big Bluestem	Early Summer	12	6	21 - 30	7 - 10
	Mid Summer	12	6	21 - 40	7 - 13
	Early Fall	12	9	120 - 210	10 - 40
Birdsfoot Trefoil - Upright Type	Spring	6 - 18	2 - 3	--	--
	Summer	10 - 15	2 - 3	--	--
	Fall	10 - 15	3	--	--
Birdsfoot Trefoil - Pros- trate Type	Spring	6 - 15	1 - 2	--	--
	Summer	10 - 12	1 - 2	--	--
	Fall	10 - 12	3	--	--
Bluegrass	Early Spring	4- 6	1 - 2	30 - 45	10 - 15
	Spring	4 - 6	1 - 2	14 - 30	5 - 10
	Summer	4 - 6	1 - 2	30 - 60	10 - 20
	Fall	4 - 6	1 - 2	21 - 35	7 - 12
Caucasian Bluestem	Early Summer	8 - 12	4	--	--
	Mid Summer	8	4	--	--
	Early Fall	8	6	--	--
Clover, Red	Spring	6 - 12	2 - 3	--	--
	Summer	6 - 10	2-3	--	--
	Fall	6 - 18	2-3	--	--
Clover, Red, in mixtures with cool-season grasses	Spring	6" to bud	3 - 4	10 - 21	4 - 7
	Summer	10" to bud	2 - 3	21 - 40	7 - 13
	Fall	Frosted ^{5/}	2 - 3	90 - 120	10 - 20 ^{6/}

TABLE 3: Recommendations for Grazing Heights, Recovery Days, and Number of Paddocks in Rotational Grazing Systems

Forage Species	Growth Periods	Height in Inches		Recovery Days ^{1/}	Number of Paddocks ^{2/}
		To Begin	To Stop		
Clover, Alsike/Ladino	Spring	4 - 8	2	--	--
	Summer	4 - 8	2	--	--
	Fall	4 - 8	2	--	--
Clover, Common White Dutch	Spring	4 - 7	1 - 2	--	--
	Summer	4 - 7	1 - 2	--	--
	Fall	4 - 7	1 - 2	--	--
Crabgrass and associated warm season species	Spring	6 - 8	3 - 4	21 - 35	5 - 13
	Summer	6 - 12	3 - 4	14-30	7 - 12
	Fall	4 - 6	1 - 3	Replant in Spring	10 - 40 ^{2/}
Crop Residue (<i>corn or sorghum</i>)	Oct-Jan	Begin grazing immediately following harvest. If cover crop is not planted, leave residue as needed for soil protection.		Not applicable	If cover crop is not planted, subdivide enough to utilize the residue while leaving cover for soil protection
Eastern Gamagrass	Early Summer	14 - 20	8	21 - 30	7 - 10
	Mid Summer	15 - 24	8	21 - 40	7 - 13
	Early Fall	15	8	120 - 210	10 - 40
Indiangrass	Early Summer	12	6	21 - 30	7 - 10
	Mid Summer	12	6	21 - 40	7 - 13
	Early Fall	12	9	120 - 210	10 - 40
Kale	60 days planted	12 -20	3	--	--
	Thereafter	12 -16	3	--	--
Lespedezas - Annual	Summer	8 - 15	3	--	--
	Last	8 - 15	3	--	--
Lespedezas - Perennial	Summer	10 - 15	3	--	--
	Fall	10 - 15	3	--	--
Little Bluestem	Spring	12	4 - 6	--	--
	Summer	12	4 - 6	--	--
	Fall	12	4 - 6	--	--
Orchardgrass	Early Spring	6 - 12	2 - 3	30 - 45	10 - 15
	Spring	6 - 10	2 - 3	14 - 30	5 - 10
	Summer	6 - 10	2 - 3	30 - 60	10 - 20
	Fall	6 - 10	2 - 3	21 - 35	7 - 12
Perennial Ryegrass	Early Spring	6 - 10	2 - 3	30 - 45	10 - 15
	Spring	6 - 8	2 - 3	14 - 30	5 - 10
	Summer	6 - 8	2 - 3	30 - 60	10 - 20
	Fall	6 - 8	2 - 3	21 - 35	7 - 12
Rape	60 days planted	12 -20	3	--	--
	Thereafter	12 -16	3	--	--

TABLE 3: Recommendations for Grazing Heights, Recovery Days, and Number of Paddocks in Rotational Grazing Systems

Forage Species	Growth Periods	Height in Inches		Recovery Days ^{1/}	Number of Paddocks ^{2/}
		To Begin	To Stop		
Reed Canarygrass	Early Spring	8 -14	6	30 - 45	10 - 15
	Spring	8 -12	6	14 - 30	5 - 10
	Summer	8 -12	6	30 - 60	10 - 20
	Fall	8 - 12	6	21 - 35	7 - 12
Smooth Bromegrass	Early Spring	6 - 10	2 - 3	30 - 45	10 - 15
	Spring	6 - 10	2 - 3	14 - 30	5 - 10
	Summer	6 - 10	2 - 3	30 - 60	10 - 20
	Fall	6 - 10	2 - 3	21 - 35	7 - 12
Switchgrass	Early Summer	12	6	21 - 30	7 - 10
	Mid Summer	12	6	21 - 40	7 - 13
	Early Fall	12	9	120 - 210	10 - 40
Tall Fescue	Early Spring	6 - 12	2 - 3	30 - 45	10 - 15
	Spring	6 - 10	2 - 3	14 - 30	5 - 10
	Summer	6 - 8	2 - 3	30 - 60	10 - 20
	Fall	6 - 10	2 - 3	21 - 35	7 - 12
	Winter (Stock-piling)	6 - 12+	2 - 3	45 - 90	15 - 30
Timothy ^{8/}	Spring	6 - 10	2 -3	14 - 30	5 - 10
	Summer	6 - 10	2 - 3	30 - 60	10 - 20
	Fall	6 - 10	2 - 3	21 - 35	7 - 12
Turnips	60 days planted	12 -20	3	--	--
	Thereafter	12 -16	3	--	--
Winter Small Grain	Fall	6-12	3	45 - 90	15 - 30

TABLE 3 NOTES:

- ^{1/} Expected number of rest days before regrazing.
- ^{2/} The number of paddocks listed here is based on a grazing period of 3 days and assumes the growth will be ready for regrazing in the number of days shown in the previous column (recovery days). Short graze periods generally result in best utilization of available forage with the least forage loss or quality changes.
- ^{3/} Frosted growth can be used flexibly, but may need supplemental protein, and it should be used before all leaves deteriorate.
- ^{4/} Number of paddocks is based on a 3-day grazing period and an attempt to use the frosted forage in 30-120 days during fall-winter period.
- ^{5/} Should usually have 45 days rest immediately before a killing frost. Thereafter, the growth may be grazed or harvested before leaves drop.
- ^{6/} Number of paddocks is based on a 3-day grazing period within each paddock and the goal of using all frosted growth in 30-60 days or before leaves drop.
- ^{7/} Late summer growth may be grazed in the fall, but quality may be limiting. Utilization can be improved with a very high stocking density to graze a paddock in a shorter time period (less than 3 days).
- ^{8/} Timothy is better suited for hay than for grazing. Poor regrowth; only suitable for less intense grazing systems. Susceptible to insect and disease problems.

Table 4 provides guidelines for managing established stands in continuous grazing systems.

TABLE 4: Recommended Residual Heights in Continuous Grazing Systems		
Forage Species	Height at First Grazing (in inches)	Average Height of Pasture (in inches)
Bermudagrass	4	2
Bluegrass	4 - 5	2 - 3
Clover - Alsike, Red, & Common White	4 - 7	3
Clover - Ladino	8 - 10	3 - 4
Fescue	6 - 8	3 - 4
Orchardgrass	6 - 8	4 - 5
Smooth Brome	Before jointing	3 - 4
Timothy	Before jointing	
Winter Small Grains	8 - 12	3 - 6

The following species tend to become depleted in stands under continuous grazing systems where no recovery period is used. Therefore, these species are not recommended for use in continuous systems:

Alfalfa (including grazing types)

Big Bluestem

Birdsfoot Trefoil (upright & prostrate types)

Caucasian Bluestem

Eastern Gamagrass

Indiangrass

Kale

Lespedeza (annual and perennial)

Little Bluestem

Rape

Reed Canarygrass

Switchgrass

Turnips